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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/492,780	01/28/2000	Kouji Matsuo	04329.2222	1363

22852 7590 04/23/2003

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
1300 I STREET, NW
WASHINGTON, DC 20005

EXAMINER

RAO, SHRINIVAS H

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/492,780

Applicant(s)

MATSUO ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-11, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) 17 and 18 is/are allowed.
- 6) ☐ Claim(s) 12-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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Response to Amendment

Applicants' amendment filed on January 30, 2003 (received on January 31, 2003 in T.C. 2800) has been entered on February 08, 2003.

Therefore claim 12 as amended by the amendment and claims 13-15 as originally filed and claims 16-18 as recited in the amendment entered on March 28, 2002 are currently pending in the application.

Procedural Issues:

For the record the previous Applicants' response (paper no. 13) was filed with the PTO On August 21, 2002, this paper was received in T.C.2800 on August 26, 2002 and was entered on August 28, 2002.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 12-16 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 12 presently recites that, "said second insulating region formed of an amorphous insulating material " i.e. they have deleted "between the first insulating regions and occupied by". And added "each of said first insulating regions being formed in said second insulating region."

The specification as originally filed including page 4 lines 8-15 and 20-26

specifically state that the second insulating region is formed in a region except

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the first insulating region (emphasis supplied) therefore the specification as originally filed does not support the present recitation of, "each of said first insulating regions being formed in said second insulating region."

Further as previously stated, to the extent Applicants' now intend to claim the second insulating region any where other than between the first insulating region and (the metal layer) the same is not supported by the original specification as filed.

Claims 13-16 are rejected for at least depending upon rejected claim 12.

Appropriate correction is required.

Applicants' contend that the specification for example page 4 lines 8 to 15 and 20-26 directly support the recitations of claim 12.

Applicants' specification page 4 lines 8 to 15 states:

" In the first aspect of the present invention, the metal containing insulating film may consist of a plurality of first insulating regions formed of grains containing a metal oxide of a metal element constituting the metal compound formed of an amorphous insulating material in a region except the first insulating regions. "

Lines 22-26 states:

" a metal-containing insulating film formed directly or indirectly on the semiconductor substrate, the metal-containing insulating film consisting of a plurality of first insulating regions formed of grains containing a metal oxide and a second insulating region formed of an amorphous insulating material in a region except the first insulating regions".

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As seen the above description has nothing to state about where the insulating layer is positioned and does not support the recitation," directly/indirectly on the substrate" and to the extent the second insulating region any where other between the first insulating region and the metal layer.

Therefore the previous 112 (1) rejection is maintained and made Final.

The previous 112 (2) rejection is maintained and made Final.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The previous rejection is maintained and reproduced below , see also the remarks to Applicant's argument section below.

Claims 12 -16 to the extent understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (U.S. Patent No. 5,962,904) and Wittmer Article (Applicants' ids Wittmer, M. et al. "Oxidation Kinetics of TiN thin films", J. App. Phys. Vol. 52 pp. 6659-6664 and further in view of Nakajima et al. (U.S. Patent No. 5,907,188, herein after Nakajima) all previously applied for reasons set out in the last Office Action (and reproduced below for ready reference) and those set out below.

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(With respect to claim 12, Hu and Wittmer describe substantially all the structure as claimed. (The previous office action incorporated herein by reference for the sake of brevity).

Hu and Wittmer do not specifically describe the limitation," Including a plurality of first insulating regions each of which is formed of a grain containing a metal oxide".

However the Nakajima reference (previously applied to claims 17 and 18) describes in figs. 31 A -I and col. 31 lines 3 to col. 32 line 50 describes a CMOSFET having a plurality of first insulating regions each of which is formed of a grain containing a metal oxide to from the CMOS devices.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Nakajima's plurality of first insulating regions each of which is formed of a grain containing a metal oxide in Hu and Wittmer's device to form a CMOS.device.

For response to Applicants' arguments stated in the preliminary amendment filed 8/28/02 against the applied references to the Final rejection of 5/31/2002 see below (response to the arguments section).

With respect to claim 16, in addition to the previous teachings of Hu and Wittmer, the newly added limitation, wherein the metal containing insulating film includes at least one surface, which is covered with a covering insulating region, made of amorphous insulating material. (Hu fig.4 14 covered by 18).

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Applicants' have not separately argued the patent ability of dependent claims 13-15 and it is presumed were alleged to be allowable at least for depending upon allegedly allowable independent claim 12.

However as shown above independent claim 12 is not allowable and therefore claims 13 -15 are also not allowable and are rejected for reasons set out in the previous Office Actions and incorporated here by reference.

Allowable Subject Matter

Claims 17 – 18 were previously allowed.

Response to Arguments

Applicant's arguments with respect to claims 12-16 have been considered but are not persuasive for the following reasons:

Applicants' contend that Hu and /or Wittmer do not teach the limitations recited in claim 12 namely, " a metal-containing insulating film (formed directly or indirectly on said semiconductor substrate, said metal containing insulating film) including a plurality of first insulating regions each of which is formed of a grain containing a metal oxide and a second insulating region, said second insulating region formed of an amorphous insulating material. "

Firstly, it is noted that the Applicants' restating of the previously stated arguments without any new issues is not persuasive because the outstanding rejection is based on the combined teachings of Hu, Wittmer and Nakajima and Applicants' above have

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• attempted to respond with a piecemeal analysis of the references, it has been held that one cannot show non-obviousness by attacking references individually where, as here, the rejections are based on combinations of references. In re Keller, 208 USPQ 871(CCPA 1981).

Secondly, the applied reference Nakajima col. 31 lines 15-16 describes a first oxide film and lines 23 wherein the underlying layer is amorphous silicon and the first oxide layer is formed by annealing the underlying amorphous silicon layer and tin lines 38-40 amorphous Silicon dioxide is described.

Thirdly, Hu as stated by applicants' in their last response (page 6 last 6 lines) describes an amorphous diffusion barrier layer 18 of refractory metal nitride and it is well known that amorphous metal nitrides are insulating material and the Hu reference uses the same material for the same purposes as described by Applicants' specification and what is true for the applicants' is also true for the Hu reference.

Applicants' second contention is also based on piece meal analysis namely that Nakajima reference does not teach, " a plurality of first insulating regions each of which is formed of a grain containing a metal oxide and a second insulating region formed of amorphous insulating material ".

Firstly it is noted that the Examiner did not incorrectly paraphrase the claim because they allegedly omitted recitation, " and a second insulating region formed of an amorphous insulating material " has been described by the combination of applied references (namely Hu, Wittmer and Nakajima , and Hu col. 5 lines 55-60 describes

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second insulating region formed of an amorphous insulating material as previously stated).

The motivation to combine the references as previously stated is Hu/Wittmer both describes Fets/ MOS and it is well known that CMOS (Nakajima) is formed from FETS namely NMOS and PMOS.

Applicants' contention that Hu, Wittmer and Nakajima disclose stacked films assuming arguendo to be true show a structure identical to the stacked film structure shown in figures 1 A to 2 E of the instant application.

The Examiner has provided all documentary and factual evidence to support his position and if the Applicants' feel there is insufficient evidence on any particular issue they can specifically point it out.

Therefore the Examiner has established prima facie obviousness beyond a shadow of doubt.

It is noted that in response to applicants' arguments set out in the response every limitation presently recited has been shown to be prima facie obvious above.

It is noted that the Examiner did not specify that common knowledge/ Official notice was taken and therefore applicants' arguments based on hypothetical assumption need not be dealt with in great detail.

With regard to Applicants' arguments on page 8 it is noted that the previous rejection stated, " The other added limitation, " a second insulating region formed between the first insulating region and occupied by an amorphous material" under rejection of claim 12.

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It is noted that Hu fig. 4 # 18 and col. 5 lines 55-60 describes a "

through decomposition of a precursor. Diffusion barrier 18 can be formed by a physical vapor deposition process that reactively sputters a substantially amorphous refractory metal silicide target in a nitrogen containing atmosphere so as to deposit a layer of a substantially amorphous refractory metal silicide nitride material. By way of example, a tung-

and therefore is completely relevant and material to the limitation of claim 12.

Claims 13 to 16 are rejected for the same reasons as previously set out (incorporated here by reference) and still not allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on 8.00 to 5.00.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 7463926 for regular communications and (703) 872-9319 for After Final communications.

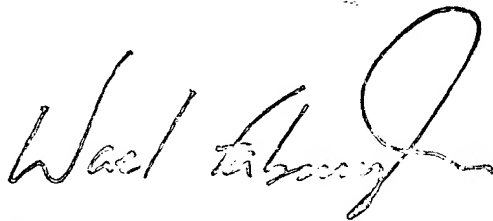
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 3067722.



Steven H. Rao

Patent Examiner

April 21, 2003



SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800